

# Aswinkumar Varathakumaran

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## Profile

Senior undergraduate focused on computer vision, generative modeling, and multimodal AI, with research experience in real-time perception systems, foundation model adaptation, and applied deep learning for high-impact visual understanding tasks.

## Education

### Vellore Institute of Technology

B.Tech in Computer Science with AI/ML Specialization — **CGPA: 8.96**

2022 – Present

Chennai, India

### Delhi Public School

CBSE XII — 94.4%

2021 – 2022

Bangalore, India

## Experience

### Undergraduate Machine Learning TA



July 2024 – Dec 2024

PI: Dr. Sajidha S A — VIT Chennai

- Assisted final year ML students with machine learning assignments, tutorials, and guided project workflows for hands-on learning.

### Deffo Tech AI

Dec 2025 – Current

AIML Intern

- Working on India's first fully indigenous Large Language Model developed under the TamilAI project.

## Publications

- Varathakumaran, A., & Paramanandham, N.** *Depth-Aware Instance Segmentation for Accurate Pothole Depth Estimation Using Monocular Depth Maps for Advanced Driver Assistance.* International Journal of Pavement Engineering (IJPE). (Under Review) [Code](#) [Paper](#)
- Varathakumaran, A., & Paramanandham, N.** *ProvRain: Rain-Adaptive Denoising and Vehicle Detection via MobileNet-UNet and Faster R-CNN.* ICSINTESA 2025. (Accepted) [Code](#) [Paper](#)
- Varathakumaran, A., Jawahara, A., Mynampati, S.A., Sajidha, & Thaseen, S.** *PROXI-NAV: Proximity-Aware Navigation with Audio-Visual Sensing Intelligence.* FTNCT'08. (Under Review) [Code](#) [Paper](#)
- Varathakumaran, A., Jawahar, A., & Pandiyaraju, V.** *CLAIMS: Clinical Labeling and Abnormality Inference from Multilead ECG using LLMs with Evidence Citation.* ICACRS 2025. (Under Review) [Code](#) [Paper](#)

## Projects

### Basketball Player Tracking with Court Projection

May 2025

(YOLOv11, Streamlit, Docker, FastAPI)

- Developed a complete sports analytics pipeline using YOLOv11 trained on custom DeepSportRadar court and player annotations, enabling robust multi-player tracking under dynamic lighting and motion.
- Computed homography transformations to map broadcast-view detections onto a top-down court representation, enabling zone-based heatmaps, possession analytics, and trajectory inference.
- Built a Dockerized Streamlit-FastAPI deployment supporting live video ingestion, asynchronous inference, and real-time overlay rendering with sub-80ms latency per frame.

### Space Agriculture Data Portal

Feb 2025

(NASA OSDR API, LangChain, Ollama, Streamlit)

- Developed a data exploration portal for NASA's Open Science Data Repository (OSDR), automating dataset retrieval, metadata parsing, preprocessing, and time-series visualization of microgravity plant-growth experiments.
- Integrated an LLM-powered query engine using LangChain + Ollama, enabling scientific question-answering grounded in experiment metadata, controlled vocabulary, and mission logs.
- Designed an interactive dashboard with modular visualizations (growth curves, environmental parameters, genotype comparisons) to support hypothesis formation for space agriculture research workflows.

### Restaurant Feedback Classifier Agent

Dec 2024

(Whisper, PyTorch, HuggingFace, Transformers)

- Designed a CNN-BiLSTM architecture on Mel spectrograms to extract prosodic sentiment cues beyond linguistic content, enabling robust affective prediction.
- Integrated sentiment outputs with contextual LLM reasoning to generate concise, human-readable review summaries and restaurant scorecards.

## Achievements

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- Program Representative for **Computer Science AI&ML branch** at *VIT Chennai*.
- Top **10 Finalist** at *Hack The Horizon 2.0* — VIT Chennai AI Club's flagship *24-hour hackathon* with **200+** participants from South India.
- Top **5 Finalist** in *Cosmonova*, a space-based research hackathon hosted by **SEDS Antariksh**.

## Extracurriculars

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- **Treasurer & Marketing Lead, Socrates Club - VIT** Aug 2023 – Present  
*Managed club finances, sponsorship acquisition, budgeting for events, directed promotional strategies, designed materials, and enhanced campus visibility.*
- **Sophrosyne VIT, Toastmasters International** July 2024  
*Was part of the newsletter editorial team and organized public speaking workshops for 80+ participants.*
- **Internshala Student Program (ISP) 2025** Mar 2025  
*Represented Internshala, promoting internships, trainings, and student engagement.*
- **Marina Beach Cleanup** May 2024  
*Co-led 3 km cleanup with 15+ volunteers.*
- **American Football Team — VIT Chennai** June 2023 – April 2024  
*Vice Captain, led a 15-member team to semi finals in a state level tournament.*

## Certifications

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Oracle Cloud Infrastructure 2025 Generative AI Professional — <b>Oracle University</b>	June 2025
Neural Networks and Deep Learning — <b>DeepLearning.AI</b>	Aug 2025
Forge Industry Certification – Accenture Nordics — <b>Forage</b>	May 2024

## Technical Skills

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- **Languages:** Python, C/C++, Java, SQL, HTML/CSS, JavaScript
- **Frameworks:** PyTorch, TensorFlow, Streamlit, React, Next.js
- **Developer Tools:** Git, VSCode, CVAT, Roboflow, Docker
- **Libraries:** OpenCV, MediaPipe, HF Transformers, LangChain, pandas, NumPy
- **Vision Models:** YOLO, Detectron2, SAM, HRNet, MiDaS, ZoeDepth
- **Core:** Keypoints, Segmentation, Homography, Depth Estimation, Video Inference
- **NLP:** NER, Sentiment Analysis, Speech-to-Text, Text Generation
- **APIs & Data:** HF API, NASA OSDR API, REST APIs, SQLite3, MySQL